



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/840,240	05/07/2004	Jin-Ook Kim	053785-5182	7617
9629	7590	10/03/2007	EXAMINER	
MORGAN LEWIS & BOCKIUS LLP			YI, STELLA KIM	
1111 PENNSYLVANIA AVENUE NW			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20004			1709	
MAIL DATE		DELIVERY MODE		
10/03/2007		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/840,240	KIM, JIN-OOK	
	Examiner Stella K. Yi	Art Unit 1709	

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 07 May 2004.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-20 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-20 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>May 7, 2004</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| | 6) <input type="checkbox"/> Other: _____. |

DETAILED ACTION

Summary

1. This is the initial Office Action based on the Application No. 10/840240 on "Method of Forming Color Filter Layer and Method of Fabricating Liquid Crystal Display Device Using the Same" filed on May 7, 2004.
2. Claims 1-20 are currently pending and have been fully considered.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being obvious over LIN (US. 6,989,177 B2) in view of XIA et al. ("Soft Lithography." Angew. Chem. Int. Ed., 1998, pp.550-575).

LIN discloses a method for making a color filter obtained by one-shot molding (Col. 2, lines 62-67 and Col. 3, lines1-15) that includes the steps of: (1) providing a

removable mold with a plurality of groove units arranged in predetermined pattern; (2) forming a black matrix on the transparent substrate; (3) attaching the removable mold to a transparent substrate that cooperatively forms a plurality of channel units; (4) filling the channel units with red-colored, green-colored, and blue-colored photopolymer solution, respectively; (5) applying an ultraviolet light to the photopolymer solution so as to cure the polymer to the transparent substrate; and (6) removing the mold with the patterned polymer layer formed on the transparent substrate.

Steps (1) and (6) corresponds with applicant's claims 1, 11, and 16 where a removable mold with grooves is being used. Step (2) corresponds with applicant's claims 8 and 16. Step (3) and (4) corresponds with applicant's claims 2, 11, and 16 where channels of the mold are filled with color resin. Step (5) corresponds with applicant's claims 3, 13, 16, and 19 where curing each of the color resin in the sub-color filters are done by irradiating light which gives off heat. In addition to applicant's claim 16, it is known to one of ordinary skill in the art that color liquid crystal display devices include an active matrix substrate on which a plurality of active elements such as TFTs are formed, a color filter substrate on which color filter layers of different colors and a common electrode are deposited in this order.

Each pixel of the color filter film used in the liquid crystal displays is composed of red, green, and blue sub-pixels; in other words, the sub-pixels or sub-filters

correspond to pixel regions of a liquid crystal device, this corresponds to applicant's claims 9 and 20.

LIN does not appear to explicitly disclose using three molds or using the one-mold multiple times, made of polydimethylsiloxane (PDMS) to form the color filter where the channels are filled with color resin by capillary action.

However, XIA et al. discloses a polydimethylsiloxane (PDMS) mold having relief structures that form a network of empty channels to be filled with a liquid prepolymer by capillary action. This is a soft lithography method known as "micromolding in capillaries". The steps of this method is illustrated in Figure 1 below:

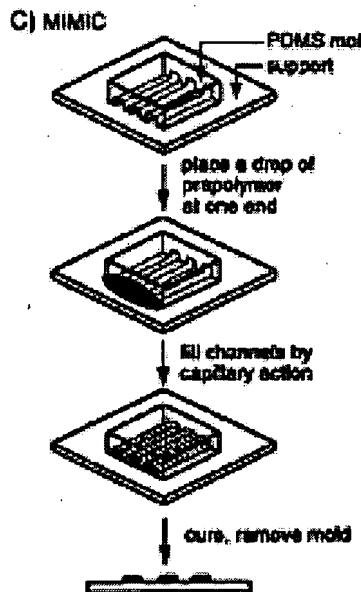


Figure 1

This method corresponds with applicant's claims 1, 5, 6, 10, 11, 14, and 16. In view of XIA et al.'s method of micromolding in capillaries, it would have been obvious to one of

ordinary skill in the art to use the PDMS mold three times or use three PDMS molds in order to form three different sub-color filters with three different color resins, as required by LIN.

The PDMS mold is an elastomer. The elasticity and low surface energy of the PDMS mold allows it to be detached easily from surfaces. It is also optically transparent down to about 300 nm in order to allow UV light to cure resin (XIA et al. pp.556, 562). This corresponds with applicant's claims 3, 4, 11, 12, 13, 17, 18, and 19. Also, the elastomeric mold offers the opportunity to manipulate the size and shape of features present on the mold so as to give different shapes to the injected resin or polymer in the mold such as a stripe shape. The cured polymers, therefore, possess almost the exact dimensions and shapes of the channels in the surface of the PDMS mold (XIA et al. p.567). This corresponds with applicant's claims 7 and 15.

LIN and XIA et al. are analogous art because they are from the same field of endeavor, that is microfabrication technology. At the time of the invention, one of ordinary skill in the art would have been motivated to modify the method of forming color filters for liquid crystal display devices of LIN to include the micromolding in capillaries method from XIA et al. because XIA et al. suggests that the use of soft lithography may be practical for display devices and that patterning techniques such as micromolding in capillaries have potential for application in emerging technologies or in high-resolution patterning (XIA et al. p.570). XIA et al.'s purpose for developing the use of soft lithography/micromolding in capillaries for the technology of

microfabrication is to provide a convenient and inexpensive method to pattern small or large surfaces of substrates. LIN stated that many efforts have been paid in the past to the development of low cost manufacturing methods with high performance product but results were hardly achieved. In this view, the object of LIN's invention is to provide a method for making a color filter for use in a liquid crystal display, which is simple and has a minimized manufacturing cost (LIN Col.1, line 65-67; Col. 2, line 46-49). XIA et al. suggests the method for liquid crystal displays and patterning, and LIN provides a display with a patterned layer. Therefore, the method of forming color filter layer for liquid crystal display device in applicant's claims 1-20 would have been obvious at the time the invention was made.

Conclusion

9. Kim, Enoch et al. "Micromolding in Capillaries: Applications in Material Science." J. Am. Chem. Soc; Vol. 118. No. 24 pp.5722-5731, 1996. - Procedures based on micromolding in capillaries using an elastomeric stamp made of poly(dimethylsiloxane) or PDMS.
10. CHEN et al. (US 2006/0210707 A1) - Method for manufacturing color filters.
11. YI et al. (US 6,809,791 B2) - Transflective liquid crystal display device having a color filter and method for fabricating thereof. An object of the present invention is to provide a color filter substrate of a reflective liquid crystal display device that has a

high transmittance and color purity, and a manufacturing method of the color filter substrate.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stella K. Yi whose telephone number is 571-270-5123.

The examiner can normally be reached on Monday - Friday from 8:00 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara Gilliam can be reached on 571-272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Barbara Gilliam

BARBARA GILLIAM
SUPERVISORY PATENT EXAMINER